| ERIC Document Resume | See Instruction Sheet | DATE OF RESUME | DATE RECEIVED |
|---|---|---|---|

**A. PUBLICATION DATA**

| 1. ERIC NUMBER | 2. ORIGINATOR CONTROL NO(S). | 3. IDENTIFICATION NO. |
|---|---|---|
| ED001319 | NA | No. 17 |

DO NOT WRITE IN SPACE BELOW

4. AUTHOR(S):
Board of Education, Syracuse, New York

5. TITLE OF DOCUMENT ABSTRACTED:
Mathematics in the Kindergarten

6. PUBLICATION TITLE:
Curriculum Bulletin, No. 17

7. EDITOR(S):
NA

8. PLACE OF ORIGIN
Board of Education
ORG. City School District
ST. Syracuse, New York
CITY, STATE

9. PUBLISHER OR SOURCE
Board of Education, City School District, Syracuse, New York

| 10. VOL. | 11. PAGES | 12. MO./YR. | 13. TOTAL PP. |
|---|---|---|---|
| NA | NA | Dec 58 | 31 |

TELE. EXT.
INST/LOC CODE

MICROFILM COPY AVAILABLE
YES ☒ NO ☐

COPYRIGHT GRANTED
YES ☐ NO ☒

COPYRIGHT RELEASE FILED
YES ☐ NO ☐

TYPE OF REPORT
PROPOSAL ☐
IN-PROGRESS ☐
FINAL ☒
FOLLOW-UP ☐

OTHER ERIC REFERENCES:

ERIC SATELLITE CODE

**B. INDEXING DATA**

14. SUBJECT AREA

15. TYPE OF ENDEAVOR
curriculum guide

16. INDEXING TERMS (6-12)

| | | | |
|---|---|---|---|
| kindergarten | teacher education | practical application | sensory experiences |
| primary education | teaching aids | arithmetic skills | arithmetic readiness |
| visual aids | pre-school learning | arithmetic concepts | Syracuse, New York |
| | | informal learning | |

17. ABSTRACT (MAX. 250 WORDS)

Materials are presented which emphasize informal learning through sensory experiences. Since much of child's encounter with numbers at this level is incidental, the intent is to provide a concrete approach for this age group. The following areas are covered:

1) suggested counting activities; 2) grouping activities such as dancing games with partners; 3) learning to recognize groups of 2, 3, and 4 objects without counting; 4) learning the ordinals, first, second, third; 5) time recognition; 6) form recognition such as geometric shapes; 7) fractions; 8) measurement; 9) comparisons of size; and 10) related personal experiences.

The objective is to acquaint the children with mathematical language.

ERIC No.

18. SOURCE OF ABSTRACT

**C. FUNDING DATA**

19. SUPPORTING ORGANIZATION

20. DIVISION OR DEPT.

21. CONTRACT NO.

PROJECT NO.

22. TOTAL COST OF PROJECT

23. DURATION OR PROJECT

U.S. Department of Health, Education, and Welfare
Office of Education

ERIC Form 1

ED001319

OS Kindergarten

**Board of Education**
**City School District**
**Syracuse, New York**

e Key
Ar
New York
1959

# Mathematics in the Kindergarten

REPRINTED BY PERMISSION
U. S. DEPARTMENT OF HEALTH, EDUCATION AND WELFARE
OFFICE OF EDUCATION

THIS DOCUMENT HAS BEEN PRINTED EXACTLY AS RECEIVED FROM THE PERSON OR ORGANIZATION ORIGINATING IT. POINTS OF VIEW OR OPINIONS STATED DO NOT NECESSARILY REPRESENT OFFICIAL OFFICE OF EDUCATION POSITION OR POLICY.

**Kindergarten Department**
**1959**

Return to
CURRICULUM LABORATORY
721 Capitol Avenue, Room 455
Sacramento 14, California

CURRICULUM BULLETIN NO. 17
1958 - 59 Series

Distribution:
Standard
Kdgn. Teachers
Supervisors

December 5, 1958

# MATHEMATICS IN THE KINDERGARTEN

Gerald A. Cleveland
Assistant Superintendent
Curriculum and Elementary
Education

Frances C. Spereau
Supervisor
Kindergarten and
Parent Education

BOARD OF EDUCATION
City School District
Syracuse, New York

Paul A. Miller
Superintendent of Schools

# PREFACE

## MATHEMATICS - IN KINDERGARTEN

We hear much of Reading Readiness, seldom of 'Rithmetic Readiness, yet it is a part of every segment of our daily program. On the following pages are a few suggested uses of Mathematics in Kindergarten. Much of the material is familiar - things we do each day. However, if only two or three new ideas are found, this study will be worthwhile, but only if they are put into practice.

The bibliography includes only one book - a text used by Syracuse University student teachers. (They might share it with you.) All other references are in pamphlets or booklets found in each Kindergarten room. Any not available there may be obtained from the Kindergarten office. They contain valuable background material. However, it is interesting to note the scarcity of special sections concerning mathematics in Kindergarten. It is not a separate item of the Curriculum, but a part of every activity - a part of living. This is as it should be, since children learn best through meaningful experiences.

Even pre-school children have many encounters with numbers - usually sensory. In Kindergarten, the learning of arithmetic may be incidental, but never accidental. It should be planned, to encourage the children's awareness and understanding. Through these extended experiences, they may be led from the concrete toward the abstract mathematical concepts of later years. We are teaching not just facts, but a way of thinking. May we thus enrich the child's whole being.

COMMITTEE:

Mrs. Gertrude Allison
Mrs. Vera Sasman
Mrs. Marion Casavant, Chairman
Advisors
Miss Rosamond Praeger, Head of Department of Kindergarten and Parent Education
Mr. Gerald Cleveland, Assistant Superintendent in Charge of Elementary Education and Curriculum

# MATHEMATICS IN THE KINDERGARTEN

## SOME GENERAL PRINCIPLES

Mathematics is inherent in many kindergarten experiences. These occur throughout the day, at school and at home.

The children need to be helped to recognize the mathematics in these experiences.

Both those occurring in the course of all types of activities and those specifically planned are needed.

Learning first takes place through sensory experiences, and manipulation; seeing, touching, lifting, moving, grouping objects in the course of the children's activities.

Experiences recurring in a variety of ways strengthen and clarify the learning.

The more part a child has in the planning and carrying out of an experience, the clearer the learning becomes. These experiences may be repeated throughout the grades in form appropriate to the childs maturity with ever increasing insight. Understanding grows slowly and is cumulative.

The children's own discoveries in mathematics should be encouraged.

The children should become familiar with the language of mathematics directly associated with the experiences.

Children will vary greatly in the rate of learning mathematics because of individual differences. Each child must have interpretation as he can comprehend it.

We should not consider arithmetic as a tool only, it is a science of numbers.

TABLE OF CONTENTS

*"LOOK UPON THE TEACHING OF NUMBERS IN THE KINDERGARTEN NOT AS FACTS TO BE TAUGHT BUT AS THE EXPLORING OF THE MINDS AND EXPERIENCES OF YOUNG CHILDREN TO SEE HOW MUCH MATURATION FOR EACH NUMBER EACH CHILD HAS."


I. SUGGESTED COUNTING ACTIVITIES . . . . . .2

II. GROUPING. . . . . .5

III. LEARNING TO RECOGNIZE GROUPS OF 2,3, AND 4 OBJECTS WITHOUT COUNTING. . . . . .7

IV. LEARNING THE ORDINALS, FIRST, SECOND, THIRD . .8

V. TIME. . . . . .10

Seasons — Clock
Calendar — General

VI. FORMS . . . . . .12

General — Square
Triangle — Oblong
Circle — Cube
Comparing Forms

VII. FRACTIONS . . . . . .13

VIII. LENGTH, WIDTH, WEIGHT . . . . . .14

IX. COMPARISONS AND DIRECTIONS. . . . . .15

X. RELATED PERSONAL EXPERIENCES. . . . . .19

XI. ACTIVITIES AND PROJECTS RICH IN NUMBERS . . . .23


*This statement and the following pages are adapted with permission of the publisher from READINESS EXPERIENCES CONTRIBUTING TO DEVELOPMENT OF NUMBER CONCEPTS IN THE KINDERGARTEN by Elda L. Merton, Co-author the Winston Arithmetics.

## SUGGESTED ACTIVITIES LEADING TO NUMBER CONCEPTS

### I. SUGGESTED COUNTING ACTIVITIES

#### Children

1. How many girls are here today? How many boys? Are there more girls here today or are there more boys here today?

2. Who is not here today? I will write the names on the board as you name them. Let us count the names. How many children are not here today?

3. Count the children to see how many P. T. A. notices we need.

4. If a carpet is used or a rug is used to sit on for "story hour" and other quiet activities, count the number of children who may sit comfortably across the front. Children may count each day to see if there are too many or not enough children in the rows across the rug.

5. At dismissal time, John or Mary may touch the heads of 5 children at a time to get their wraps.

#### Supplies

6. How many sheets of paper, balls of clay or scissors are needed for the children at this table?

7. How many crayons in your box?

8. Count the books on our library table?

9. How many large blocks did you need to make the boat? (or anything built with blocks)
How many small blocks?

#### Equipment

10. How many chairs are needed for the children at this table?

11. How many dolls in our playhouse? How many big dolls? How many little dolls?

12. Count all our plants. How many plants to water?

13. How many fish in our aquarium? How many big shells?

14. How many pictures have we on our bulletin board?

Lunch

15. Count the children to be served at this table.

16. How many children do we need to set our lunch tables, if we have one table setter at each table? Permit a child to choose and touch the heads of these chosen helpers.

Birthdays

17. How many candles on Sally's cake?

18. Billy has brought cookies for a birthday treat. Will there be enough cookies? Count the children. Now count the cookies. Are there enough? How many are left over?

19. How old is Jim today on his birthday? How many candles shall we draw for him on the kindergarten birthday cake on the blackboard?

Dances and Rhythms

20. Count the steps to take
    Slide, Slide, Clap, Clap, Clap!
    Slide, Slide, Stomp, Stomp, Stomp!

21. Count the children needed for dances where partners are required, or four in a group as in the dance "I See You".

Dramatizations

22. How many characters will we need to play this story? (1 troll, 3 billy goats; or 1 Mother Pig, 3 little pigs, 1 wolf). Have children stand as parts are assigned. Then count.

23. Circus Trained Animals. Ponies paw 6 times; seals wave flappers a stated number of times; dogs bark, etc. Noisy but fun.

Special Days

24. We will put a jack-o-lantern (or Christmas tree, or snowman, or any seasonal decoration) in each window. Count the windows to see how many we shall need to make.

25. How many visitors are in our room today? How many visitors did we have this week? Count the names of all the visitors in our Guest Book.

Games

26. We need (stated number) of children for this game. Billy may choose them. Count to be sure you have the right number.

27. Count to see how often Sue can jump rope without missing. Children count aloud while the child is jumping. Who jumped the longest without missing?

28. Count to see how often Bobbie can bounce the ball without missing. Bobbie bounces the ball while the children count aloud until he misses. Who bounced the ball most times without missing?

29. Count the number of children on each side at the end of the game.

30. "Jack in the Box" Game:
    Children sitting in a circle, each child squatting down as if in his box. The "Jacks" count, beginning with one. As Jack <u>one</u> says "one" he jumps out of his box. As child <u>two</u> says"two" he jumps out of his box, etc. After all are out they count the opposite way, going back in the box.

31. Count to 10 for hiding games.

32. Number of chairs set in a line,every other one in opposite direction for the game "Musical Chairs" must be one less than the number of children who will play. As music stops every child scrambles for a seat. One child has no chair. He is "out". One more chair is removed from the line, and the music begins again and children march around the row of chairs. Find illustration of subtraction; one child too many; not enough, one less than.

<u>Rhythmic Counting</u>

33. Number Jingles:
    "One little, two little, three little Indians"
    "Baa, Baa, Black Sheep"

<u>Money</u>

34. Dick has brought these pennies to buy a health seal. Let us count to see how many pennies he brought.

35. Count the pennies brought in for milk; the dimes brought in for the March of Dimes.

<u>Art and Construction</u>

36. In making Indian head bands, count the paper feathers or real feathers needed for each head band. Twelve feathers properly spaced will fill the band. Each child may count his own feathers and put them into a little pile in front of him to paste on his band. Or any game involving quantity.

Miscellaneous

37. Count as we go up the stairs. How many steps to climb?

38. How many rooms in our school: How many rooms downstairs? How many rooms upstairs?

39. How many members in child's family?

40. How many pets have you at home?

41. Counting the buttons on children's clothes is fun. Who has the most buttons?

Advanced Counting Activities for Accelerated Children

42. Large balls of paper cut out of primary colors may be placed along the piano ledge, ten in all. Play games like the following:

    a. Pick out all the red balls. How many are there? (Continue with all colors.)

    b. Close eyes. Child takes away any number of balls he chooses. Eyes open. Question: How many balls are left? Can anyone tell how many balls have gone away?

43. Make large number charts with large number at top. Five charts with numbers from 1 to 5. Collect pictures distinct in number concept, so number of objects is easily discerned by the young child. Pictures are shown and child counts and decides on which sheet picture should be pasted.

44. The Flower Basket. Draw and mount a large French flower basket with 10 slots in it. From seed catalogues cut out large colored flowers. Mount on cardboard and leave tabs. Play game.
    "Put 5 flowers in the basket."
    "Make the basket hold just 4 instead of 5 flowers."
    "Make the basket hold 6 flowers," etc.

II. GROUPING BY 2'S

Noting the occurrence of two is a valuable number experience.

1. Children march in a double line. We march two by two. Two side by side. We march by 2's.

2. "Pairing off" for marching, for games, for dances, for lining up to pass to toilet, to playground, or for going home.

3. "Partners" in a games, or in a line, or in a dance.

4. What things come in pairs?

| | | |
|---|---|---|
| shoes | mittens | boots |
| socks | gloves | drum sticks |
| stockings | ice skates | rubbers |
| slippers | roller skates | shoe laces |
| galoshes | skis | garters |

5. Girls (or boys) wearing brown shoes stand. See the 2's. Count the brown shoes one at a time. Who can count the shoes two at a time? Which way is a faster way to count?

6. Girls (or boys) wearing black shoes stand. See the 2's. (Repeat as in 5)

7. Girls (or boys) wearing white shoes stand. See the 2's. (Repeat as in 5)

8. Repeat with mittens, socks, etc. as in 5.

9. We have two hands, two feet, two legs, two eyes, two ears, two cheeks, two rows of teeth, two lips, ---but we have only one nose, one chin, one head, etc.

10. There are two wings on an airplane, two wings on a bird, two sleeves on our coats, two legs in a pair of trousers.

11. Both of you may go.

12. Each child may take 2 crackers or cookies.

13. First two rows are on one side for the game. Next two rows are on the other side.

14. Bobbie and Billy are twins. They look alike. They dress alike. They must buy two of everything when their mother gets new clothes for them.

15. We watched a pair of robins build their nest. Mother Bird brought sticks and mud. Father Robin helped her build the nest.

16. Jim has a pair of white mice. This morning there were six baby white mice in the cage.

17. A pair of wrens have come to live in the wren house in Sally's back yard. (Illustration brought in by thoughtful and observing child.)

18. Dancing Game: "How Do You Do My Partner?"

19. Terms: pair, couple, double, both, by twos, pair off, twins.

20. There are many, many twos. Now let us look for some threes.
    3 little pigs
    3 Billy Goats
    3 little kittens lost their mittens
    3 blind mice
    3 men in a tub
    3 bags full
    3 colors in our flag
    3 wheels on a tricycle
    the 3 bears

III. LEARNING TO RECOGNIZE GROUPS OF 2, 3, AND 4 OBJECTS WITHOUT COUNTING

1. Bring the box with 4 blocks.

2. How many wheels has the bicycle? The tricycle? The automobile?

3. What has two legs and two feet? (boys, girls, father, mother, birds, chickens, turkeys, ducks, geese.)

4. What has 4 legs? (Any four-legged animal with which the children are familiar, kindergarten chairs, kindergarten tables, etc.)

5. Two blocks on a pile, 3 blocks, or 4 blocks on a pile.

6. Three rooms in the dollhouse.

7. Three fish in the aquarium.

8. Our two pet turtles.

9. An airplane has three wheels.

10. Some kindergartens have small tables with four chairs at each table.

11. Working in groups of 2, 3, or 4 children at easel; at sand table; in doll house; at work bench.

12. In counting coins of like value, (all pennies) count them by taking two at a time and counting one TWO, three FOUR, five SIX, with emphasis on a capitalized word. With accelerated groups they may actually learn to count a small number of things by 2's.

13. Feeling the rhythm of music as: 1, 2; or LOUD, soft; 1, 2, 3; or LOUD, soft, soft; 1, 2, 3, 4; or LOUD, soft, soft, soft, soft.

14. Hold out both hands.

15. Every car has two headlights. Our toy truck has two headlights and four wheels.

16. Our doll has two eyes, two arms, two hands, two legs, two feet.

17. Get enough drawing paper so the three of you have some.

18. In making colored paper rings you join the two ends to make a ring.

19. Two, three, or four friends.

20. The three Johnson children.

21. Children at each table who have mittens may lay their pairs of mittens down on the table for all to see. Then count the pairs. 1, 2, 3, 4 pairs of mittens. This shows how many children have mittens at each table. Now count the children who own the mittens. The children will see that the number is the same.

## V. LEARNING THE ORDINALS, FIRST, SECOND, THIRD

1. Joe may be first in the line today.

2. Miss Brown is the first grade teacher, Miss Jackson is the second grade teacher, Miss Williams is the third grade teacher. When we leave kindergarten we will go to first grade first, to second grade next, and to third grade next.

3. John may have the first turn. Peggy may have the second turn. Jane may have the third turn.

4. Who won the first race? Who won the second race? Who won the third race?

5. The first Billy goat did not finish off the old troll. The second Billy goat did not finish off the old troll either, but what did the third Billy goat do?

6. The first little pig built a house of straw. Of what did the second little pig build his house? Of what did the third little pig build his house?

7. This is Monday. This is the first school day of the new week.

8. This month is January. This is the first month of the new year.

9. David is the first one ready to go home. Who will be second? Ellen is second. Who can be third?

10. What song would you like to sing first today?

11. Mary has the first birthday in this new month.

12. Fold your paper this way the first time. The second fold must go like this.

13. The first child is the leader in the relay game.

14. The first child may be the drummer in our marching band.

15. The first child finished may start to dress for the play.

16. Jane, you may take this note to the second grade room.

17. Put your rug in the first cubby hole.

18. We rest awhile the first thing after play.

19. As we look down the rows of numbers on our big room calendar, Sunday is always the first day of the week. (Show the children where all the Sundays are on their calendar.)

20. Thanksgiving will come first, Christmas is second, and Valentine's Day is third.

21. John's picture is third from the left on our bulletin board. Find your picture for your mother, John.

22. What is your first name. Your middle name is your second name. Your last name is your third name.

23. Next year you will be in the first grade.

24. Bus stop: "I live at the second stop."

25. Birthday: "Yes, this is my little sister's third birthday."

26. Grade: "My big sister is in the sixth grade."
"I know the fourth grade teacher."

27. Opinion: "I like the second one best."

28. Let's play our new game. Who will be first? Who would like to be second.

29. Sit in the third chair, Betsy.

30. Lining up for the slides or the swings: John is first, etc. .

V. TIME

Seasons

1. This is fall. What are some of the things children do in the fall? What are some of the things Mother does in the fall? Name some of the work Father must do in the fall. (Repeat for winter, spring, and summer at the proper time of year.)

2. Summer: All children who will have a birthday during our summer vacation stand. Count the children who will have birthdays during vacation. (If used, tell them the day before to ask mother when their birthday comes.)

3. Keep seasonal pictures and decorations in the room to provide a seasonal background.

4. Make references to seasons in conversation periods. "Now it is spring and the grass is getting green." or "The days are growing longer. Did you see how much lighter it was when you got up this morning than when you got up on those cold winter mornings?" or "Now it is fall and the leaves are beginning to get red and yellow and brown." or "The leaves are falling now, for the fall has come."

Calendar

5. This is September. We begin school in September. Repeat some special reference to each month for each month the children are in school.

6. Give emphasis to any holidays that come in the month. Learn special holiday songs and poems.

7. Make much of the birthdays that come in the month. On any child's birthday draw a colorful birthday cake. On it draw the correct number of candles. Emphasize, how many years old is Jerry today? Find Jerry's birthday number on the big calendar.

8. Have a large room calendar. Each day mark off the day on the calendar. On special days paste in the space something which will indicate the nature of the special day, like a heart for Valentine's Day, a hatchet for Washington's Birthday, a picture of Lincoln for Lincoln's Birthday.

9. Birthdays should be marked on the calendar each month. As each child's birthday comes, he may color his birthday square.

10. Keep a weather calendar. Mark each day, snow, rain, sunshine. Mittens can indicate cold, a snowman for snow, umbrella for rain, sun for sunny, and a white cloud for cloudy.

11. Child learns that each day on the calendar has its number.

12. Children change room calendar to a new month page as a group activity and discuss important happenings to watch for in that month.

13. Today, yesterday, tomorrow.

<u>Clock</u>

14. Call attention to things that happen on the hour and point to the clock to associate the time with the activity.

15. Set a play clock to the time for singing. At intervals compare the room clock with the play clock. Not time yet, almost time, now it is time for singing.

16. Times to look for on the clock:
    Time to go home
    Time for lunch period
    Time for certain games
    Time for stories

17. We must be ready in 10 minutes. (To child it means a short time to finish. Hurry!)

18. Morning, Noon, Afternoon, Night time

19. Time to clean up.

20. Time for Mother to meet you.

21. Time to go home to lunch.

22. What time does the school bell ring?

23. What time is your bed time?

General

24. Appreciation of time by associating it with events of the day, time for music, time to go home, time to drink milk, Saturday, Sunday, special holidays, birthdays.

VI. FORMS

General

1. Square, circle, triangle, oblong, cube, diamond.

2. In stories the shapes of objects are mentioned when possible, "the big ROUND moon", "the little SQUARE box".

3. If paper being used is one of the forms listed under "1", attention may be called to the name of the form.

4. Children build using blocks of different shapes.

Triangle

5. We will use this triangle shape to make our May baskets.

6. Jimmy played the triangle in the band yesterday. Show why a "triangle".

7. Look for triangles in our environment.

Circle

8. Make a big circle for our game today.

9. Snowman cut out is made with 3 circles, one big, one middlesized, and one small.

10. We draw a circle to draw the sun, wheels, etc.

11. Some kindergarten tables, some library book tables in kindergartens are round.

12. Look for other circles.

Square

13. Our doll house is square.

14. Form a square for a folk dance.

Oblong

15. Some tables in kindergarten may be oblong.

16. Crayon boxes are oblong.

17. The windows and doors are oblong.

Cube

18. Some kindergartens use boxes filled with cubes; also some blocks are cubes.

Comparing Forms

19. Which shape is better for making the cut out snowflakes, the square or the oblong? Which is better for making the paper doilies the square or the oblong?

20. Which shape do you want for making your Christmas card, the square, the triangle, or the oblong?

21. Which shape of block would be better to use next, a square block, or an oblong block?

## VII. FRACTIONS

1. Half, quarter, equal parts.

2. Teach how to fold a sheet of paper in halves and then in fourths. Fold it again this way to fold it in fourths. (Since many folding construction activities can be planned around folding a sheet of paper into fourths, the concept of fourths is listed as a concept for kindergarten children. It should not be forced as a concept, however, and if the need for introducing it does not arise the concept may not be introduced at this early stage for number readiness at all. Also accelerated groups can grasp the concept readily in the five year old groups.

3. There is no such things as taking the biggest half of an apple or of a piece of cake or of a candy bar. Halves are exactly alike if you cut an apple in half. The two halves of a candy bar are exactly the same size. The two halves of a piece of cake should be the same.

4. Teach children how to share an apple, a candy bar, a candy stick, a cookie, an orange, equally with another child. You have given Billy half of your cookie, because the piece you have and the piece Billy has are exactly the same size. One is just as much as the other.

5. "Show me Jim, how will you share your cookie equally with Tom." "Children, are the two parts of Jim's cookie the same size?"
"No! One part is larger."
"Then we cannot say that Jim is giving Tom half his cookie."

6. We must not name a part one-half unless it is one of two equal parts of something and the parts are exactly the same size.

7. John has a piece of paper. Billy has none. John wants to give half of his paper to Billy. Who can show him how to divide the paper in half.

8. You can fold a paper into two equal parts lengthwise, crosswise, diagonally. All have been folds to fold the paper in half.

9. Four children want paper. There are two large sheets of paper. How shall they divide the paper so that each of the four children has the same? Let the children offer suggestions. Here is an excellent opportunity for discovery.

10. Two boys share four blocks in building. Two and two.

11. Teacher folds and tears a large sheet of colored paper into halves. Each of two children gets a piece. "Each of you may have half of my paper."

12. Use only half of your ball of clay today. Share the other half with Billy. Be sure you each get the same amount.

13. Half of a paper towel, or any other item.

14. In the school play four children are birds. Half are blue birds. Half are red birds.

15. I am five and one-half years old.

## VIII. MEASURES: LENGTH, LIQUID WEIGHT

(At the beginning merely judge lengths, widths, and thicknesses without consciousness of measuring process)

1. Show a yardstick and a ruler. Teach their names.

2. Is the object under consideration shorter or less than a foot ruler? Is it more than a yardstick? Which would be better to use to measure how much of the floor to use for our stage, the ruler or the yardstick?

3. How big a piece of paper do you want for your valentine, one like this that is 4 inches, one like this that is 5 inches, or one like this that is 6 inches? (Instead of merely passing out paper to children a question such as this asked occasionally sensitizes the child to the language of measurement.)

4. How large a space should we measure off on the floor for our food market? Shall we use the ruler or the yardstick?

5. In the kindergarten the actual measuring is never entirely accurate. This should not be the point of emphasis. Rather these are opportunities for the children to see some uses of the processes and to become acquainted with the appropriate tools and the vocabulary of measurement i.e. inch, foot, yard, ruler, yardstick, measure.

6. Use the yardstick to measure long paper for borders or for murals or a large frieze painting. How many "sticks" long?

7. Use the yardstick to measure the playhouse or the store. How many sticks long?

8. Our room looks longer than it is wide. Let's prove if this is right by measuring with the big stick. How many big sticks long? How many big sticks wide? Which side of the room is longer?

9. How far apart can you stretch your fingers? How close together?

10. Stepping off distances for games. This will help the children to see the need for measures as their steps will not be all the same length.

11. In play store call attention to pint and quart size.

12. The milkman leaves 2 quarts of milk a day at Mary's house.

13. Have quart and pint bottle at school for comparing quart and pint, pouring water from one to the other.

14. The nurse or kindergarten teacher takes the children's height and weight at intervals during the year. Explain to the children what is being done.

15. What things in our store are sold by the pound? Sugar, butter. By the quart? Milk.

## IX. COMPARISONS AND DIRECTION

1. Dramatization: (pointing to or holding up) We have two hands and two feet but only one head, two eyes but only one nose, two ears but only one chin.

2. The furniture may be used to show over, under, above, below, etc.

3. On birthdays some child is older or younger than another, or the same.

4. With dolls and paper dolls, some are bigger or smaller than others.

5. In the store a dozen eggs is more than a half dozen. One half pint of milk is less than a pint.

6. Terminology of comparisons:
   big, bigger, biggest, little, small, smaller, smallest, tall, short, wide, high, low, above, below, under, alike, different

7. Terminology of direction:
   on top, underneath, in, out, over, under, near, middle, left, right, backward, forward.

8. Bring me two blocks that are alike. These two are different.

9. I'm bigger than you are.

10. I'm older than my little brother. He is smaller.

11. That one is taller, or wider, or shorter, etc.

12. Younger
    Name younger brothers, sisters, cousins, friends,
    Child is younger than mother, father, grandmother, grandfather.
    It would not be fair for you to race with him. He is so much younger than you are.

13. Older
    Name older brothers, sisters, cousins, friends.
    Bobby is older than I am.

14. Longer
    Should these two children run the race?
    Would it be fair?
    Has John longer legs than Billy? Whose legs are the same length as John's?
    This table is longer than it is wide.
    I sleep longer on Saturdays than on the days I come to school.
    Show me a long stick; a very short stick; a longer stick.
    His string is longer than mine.
    Which table is longer, or longest? Higher or highest? Shorter or shortest?

15. Shorter

Our school day is shorter than theirs.
Show me the shortest step you can take; the widest step; the longest.
John should not race with Billy because Billy's legs are so much shorter. The race would not be fair.

16. Smaller, Smallest

Play game: "I am thinking of something smaller than this." (holding up a rubber ball) etc.

17. Farther

I have three blocks farther to come to school than Jimmy.

18. Nearest

Get the nearest you can to the door; the farthest away.

19. Taller

His brother is taller than he is.
Jane is just as tall as Judy, but Judy is taller than Sue.
Our daddies are taller than we are.
Who is the tallest boy in the room?
The shortest?

20. Same

Her doll is the same size as mine.
You need another board the same size as this one.
Two halves of an apple should be the same.
We are the same age.

21. Thinner, Fatter

Joey is thinner than his brother.
John is fatter than Jim.

22. Biggest

Which apple is biggest? Smallest?
Put the balls in a row. Put the biggest first; the littlest last.

23. Littlest

Will all these things go into the littlest box?

24. Big, middle-sized, smallest

The Three Bears: 3 bowls, 3 bears, 3 chairs, 3 beds.
The Three Billy Goats Gruff.

25. Big, Small

See how many balls will fit into this box. Which are too big? Which are too small?

26. Little

With your hands show me a little ball; a little circle; a bigger circle; the biggest circle you can make; the tiniest circle you can make.

27. Shorter, Shortest

Our school day is shorter than theirs. We come for only half a day. Show me the shortest step you can take; the widest step; the longest. We need a shorter chair to trim this part of our Christmas tree.
Sue hangs up a shorter stocking for Santa than her sister uses.
The days are growing shorter. It gets dark so early now.
I have a shorter way to get to school than the way I used to come.

28. Wider

This door is wider than that door.

29. Faster, Slower

He should skate faster. His legs are longer.
Let's walk faster; slower; very slow; very fast.
John would run faster than Billy because John's legs are so much longer than Billy's.

30. Heaviest

Which of these chairs is heaviest? Largest?

31. Smallest

Fill the smallest pail with sand.
Bring me the smallest block.

32. Tallest

Stand in line, the tallest child first and the shortest child next, or the shortest child last.

33. Big, Wee

Show me the big fat pig; the wee little puppy; the very tall man.

(The following are illustrations of direction.)

34. Place the big chair at the front of the room.

35. Make a big circle. John may be in the center, Jim on the outside.

36. Put the sticks in the long box.

37. Bring a handful of pegs to your table.

38. Get the red book from the top shelf.

39. How low can you put your hand? How high?

40. Use a small table in front of the group. Fill with objects easily moved. Play a "Placing Game".
    Put the block under the table.
    Put the cup in the middle of the table.
    Put the little teapot near the cup.
    Put the spoon in the cup.

41. Dancing and Rhythms. Step forward, backward, to the left, to the right, sideward.

X. RELATED PERSONAL EXPERIENCES

1. Mother and I bought 3 pairs of socks, 2 pairs are for me, and 1 pair for my little brother.

2. I had to mail a card and a letter for Mother. We put a 3-cent stamp on the card but we had to put a 4-cent stamp on the letter.

3. We visited my auntie in the hospital. We found her room because there were numbers on the door.

4. Our house has a number. The number helps people to find where we live.

5. We went to the library. The picture books had numbers on them. When we wanted to take the books back to our kindergarten the lady at the desk copied the numbers down. Then she knew which books we took. She will check these numbers when we take our books back.

6. We changed the water in our aquarium today. We had to put 6 quart bottles of fresh water in. We put tally marks down to help us to keep track of how many bottles had been put in. When there were 6 tally marks we knew there were 6 bottles of water in the aquarium. Then we did not put in any more water.

7. Ruth had a birthday party. She brought big lollipops for all of us. There were enough lollipops for all of the children. There were more than enough. We passed them to the children first. Then we gave one to the teacher. There were three lollipops left over. Ruth gave one to the principal, one to the first grade teacher and one to the second grade teacher. There was none left for the third grade teacher.

8. I went into a big, big store with Mother. We had to go up, up in an elevator. We got on at the first floor. We got off on the third floor. When we got back on, the row of numbers over the door showed that the 3 was lighted up. We went up to 4 and the lighted number changed. Now the 4 was lighted. We went up to 5, 6, 7, 8, 9. We got off on 9. On the way back I watched the lighted numbers, 9, 8, 7, 6, 5, 4, 3, 2, 1. Then we got off.

9. Situation 8 is an excellent one to dramatize. Children may stoop way down low at 1. Count 2, 3, 4, etc. rising slightly with each new "floor". Then to come back down, start 9, 8, 7, 6, etc. stooping lower and lower until at 1 the child has stooped to the floor.

10. I watched the big boys skating on the river today. A big boy skated long slides. He would go ahead and then he would skate backwards to the place where he started.

11. Situation 10 is an excellent game to dramatize. Skate ahead 6 long slides. Count 1, 2, 3, 4, 5, 6. Now skate backwards to 1, the starting place. Skate back and count 6, 5, 4, 3, 2, 1.

12. We could not decide whether to name our new turtle "Pokey" or "Snapper". Some children wanted one name. So our teacher told us we would have to "vote" to see which name most children wanted. All the children who wanted the name "Pokey" stood up. We counted them. Miss Gray wrote the number on the board. All the children who wanted the name "Snapper" stood. We counted them. Miss Gray wrote the number on the board. The name "Pokey" had the big number. More children wanted that name. So we named our little turtle "Pokey". I guess we wanted that name because he moves so slow and pokey.

13. We played"Musical Chairs" in school today. Each time the music played we had to march around a line of chairs. But there were not enough chairs. One chair was missing. When the music stopped everyone tried to sit on a chair. The one who was left behind had to go and sit in the circle. One more chair was taken away. (Subtraction readiness). Then we tried again. I won. I was the one who stayed the longest. I was the last. (Comparison).

14. Mother and I bought 3 dozen cookies for the party.

15. Mother baked 2 loaves of nut bread today.

16. My pet Mother Cat had 5 kittens.

17. I got 3 picture books for my birthday.

18. All clocks have numbers, don't they?

19. I know my numbers to ten.

20. We have 3 pet rabbits.

21. I'm five. I had five children at my party.

22. I can tell you which record you play next because I can read the numbers on them. (6 in album)

23. There are 26 boys and girls in our morning class. 13 boys and 13 girls. Count the boys who are here today. (10) Count the girls who are here today. (12) Are all the boys here? No. Are all the girls here? (No.)

24. I live on the third floor. Paul lives on the second and Dick on the first.

25. I have 10 toes. 5 on each foot.

26. My birthday will be 4 days from now.

27. When my mommy goes to the store she has to take a number and take her turn to be waited on.

28. There are numbers on all the things in the grocery store. They tell how much the things cost.

29. I know my phone number.

30. I know my street number.

31. My daddy's car has a big number on it.

32. There are numbers on our radio at home. The numbers help to find the stations.

33. I have 8 buttons on my new dress.

34. My little brother is just 2.

35. There are 3 families living in our building.

36. Milk will be 22 cents a quart next week. Mother says, that it takes 2 dimes and 2 pennies to buy a quart of milk.

37. I have 20 cents for lunch.

38. I have a nickel for the bus.

39. I have 2 new dresses.

40. There are 2 erasers at the board.

41. We put 4 chairs at each table.

42. We have one rest rug for each child.

43. I need two papers to make my wagon.

44. I got 5 toys for my birthday, (counting on fingers: a boat, a ball, an airplane, a policeman's whistle, a toy truck.) See? I got 5 all right.

45. I live 8 blocks from school. I have a long way to have to walk.

46. I have 2 friends in our block.

47. We have 5 in our family.

48. We have learned 2 songs about Santa.

49. We have 4 pets in our kindergarten.

50. Mother took 4 of my friends and me to the movie.

51. I went to my aunt's house to visit. We stayed 10 days.

52. I listen to 2 radio programs each day.

53. The school room doors have numbers on them.

54. The numbers in the picture books are for counting the pages.

55. Five people were in the car.

56. The milk money period provides the most consistent conversation about numbers.

57. I like big red apples. Mother bought 6 big red apples yesterday. I counted them.

58. Nancy puts her money into her bank.

59. This box is not deep enough for my doll.

60. My box has 6 sides. See I can prove it, here, here, here, here, and the bottom side and the top side.

61. That round box will make a good hat for the little monkey in our circus.

62. Both of my shoes are muddy.

63. Mother put my name in both of my mittens and in both of my rubbers.

64. I haven't any paper.

65. This plant has the most flowers.

66. Only one more week to wait for santa to come.

67. That was a good fire drill. We were all out of the building in 3 minutes.

## XI. ACTIVITIES AND PROJECTS RICH IN NUMBER

1. As an illustration of one excellent activity in which every number concept is brought out to the fullest, I shall quote Miss Olga Adams' description of an activity carried on in the University of Chicago laboratory school kindergarten.

   See Supplementary Educational Monograph "Arithmetic 1947" Monograph 63, October 1947, The University of Chicago Press "Arithmetic Readiness in the Primary Grades" Olga Adams.

## Learning Through An Experience

"In the kindergarten of the University Laboratory School there is one outstanding example of a very vivid experience which involves number in almost all its fundamental aspects. Each spring we bring a setting hen into the room. The children and the teacher provide her with suitable "setting" arrangements and a batch of fertile eggs. We judge from her size how many eggs she can cover adequately, and we put these in the nest. If twelve eggs, one dozen, do not seem enough, add others one by one, keeping track of the total number as we do so, until 'she can hold no more,' so said one child. We identify on the wall calendar the date on which she began to sit, and we mark it in some appropriate fashion.

The children are then told that it will take twenty-one days or three weeks, for the eggs to hatch. We count off that number of days and also mark the hatching date on the calendar, figuring in how many days the hen has sat and how many more days she will have to sit before the chickens hatch. We use written numbers for the daily reckoning, keeping the increasing numbers on one nail and the decreasing numbers on another. We summarize our findings each day: 'She has sat on her eggs 1 day. She will have 20 days more. 1 and 20 are 21.! Very soon such comments as these begin to come:

'This is frontward counting, and this is backward'
'These numbers get bigger and bigger; and these smaller and smaller.'
'This is very easy arithmetic; the answer is always 21.'

"When the numbers are 10 and 11, we say, 'Almost half-way' or 'A little more than half-way.' When it is 7, we say, 'Seven days,' or we can say 'one week, because there are 7 days in one week. How many more weeks to wait?' There is usually some child who volunteers. 'Two weeks because 7 and 7 make 14.' We then verify such a statement on the calendar.

"If some eggs are broken, or do not hatch, subtraction is involved. Unfortunately, before the hen and chicks are finally taken back to the farm, there is often a good deal of practice in subtraction. Although the experience is packed full of number problems which are of vital concern to the children, many who have shown little interest begin to 'study' the two columns of figures, to ask help in naming the numbers, and to struggle with the addition and subtraction process.

"This is only one example of the many vivid experiences of young children which give ample opportunity to build readiness for arithmetic. We must be keenly aware of all possibilities, careful to use right arithmetical terms in our speech, and resourceful in helping children both to become conscious of number processes and to use them effectively within the limits of their abilities."

Additional Projects and Activities

2. Kindergarten Store (Toy Store, Grocery Store) All number experiences such as prices and buying involved in this. Real advertisements obtained from grocer are used to cover store counter fronts. Small cash register is used and play money exchanged for goods.

3. Make a large boat, large enough for children to play in. (Measuring involved with ruler and yardstick.)

4. Make small boats. (Made by individual children.) A ruler and yardstick are used to mark wood pieces into 5 inch lengths to make little boats and 10 inch lengths to make bigger boats. Then the sawing begins.

5. Make a train large enough for children to play in. Old barrel starts off for engine. Wheels, smoke stack, bell, follow. Cars follow. One teacher suggested train be built on coaster wagons. It was and actually moved anywhere in kindergarten. Number enters into measuring, tickets, number getting on and off at each station, etc.

6. Make valentines. Number enters into size of paper, shape of paper, and number child desires to make.

7. Parties for birthdays and special days. Number enters into setting table, arranging chairs, making place mats or napkins, etc.

8. Program for mothers.
   Bake cookies (measuring, counting)
   Make cocoa (buying milk, paying for milk, measuring)
   Plan and figure amounts children should bring for baking the cookies.
   Count mothers and children for cookies, nut baskets.
   Count those who will serve.
   Count those who will sing.
   Count those who will play in the band.
   Count those who act as hosts and hostesses.

9. Puppet Show. (Measuring, tickets, chairs needed for visitors)

10. The doll show.

11. The kindergarten circus (Making costumes, dances, parade, tickets, making of Indian hats and tom-toms.)

12. Toy Store. Shelves are set up and children make many toys and toy animals to set up on the shelves. Toys sell from 1 cent to 5 cents. Children learn to put price tags on various toys according to class decision as to what individual toys should sell for.

13. Games:

<u>At Christmas time</u> to the tune of "Farmer in the Dell" sing:

Santa's in the ring, etc.
Santa take a doll.
Santa takes 2 drums.
Santa takes 3 clowns, etc.

Santa in center points out the number he sings and those children impersonate the toy and come into center.

<u>At Easter time</u>:

"Five Little Bunnies "

<u>Indians</u>:

"Ten Little Indians"

Indians seated. One little, two little, three little Indians, etc. Each Indian stands as it becomes his turn in the line to show the number sung.

# MATHEMATICS IN KINDERGARTEN

## *BIBLIOGRAPHY


ARITHMETIC - CHILDREN USE IT - Edwina Deans, Association for Childhood Education International, Washington,D. C., 1954 - pp. 3-15, 56

LIVING AND LEARNING IN THE KINDERGARTEN - A CURRICULUM GUIDE - Bureau of Publications, Baltimore Public Schools, Baltimore, Maryland, 1954 pp. 40, 69-71

MAKING ARITHMETIC MEANINGFUL - Brueckner, L.J. and Grossnickle, F.E., John C. Winston Co., Philadelphia, 1953 - pp. 2-23, 100, 105, 106-108, 110, 123, 167, 177

THE THREE R'S IN ELEMENTARY SCHOOL - Association for Supervision and Curriculum Development, N.E.A., Washington, D.C., 1952 - pp. 99-103, 107, 108, 110

PUBLICATIONS OF NEW YORK STATE DEPARTMENT OF EDUCATION

CHILD DEVELOPMENT GUIDES, 1955 - pp. 87, 88

CHILDREN LEARN IN KINDERGARTEN, 1958 - pp. all, especially 3-7, 11, 12, 15-17, 21-24

ELEMENTARY SCHOOL CURRICULUM, AN OVERVIEW, 1954, Bureau of Elementary Curriculum Development pp. 15-29 (p.20)

THE THIRD R - 'RITHMETIC, 1958, Bureau of Elementary Curriculum Development - pp. 1-12, 15, 19, 24, 25, 46, 47, 51, 52

WARREN KINDERGARTEN DOORS ARE OPEN TO THE FIVE-YEAR-OLD Warren City Schools, Warren, Ohio (Teaching Staff Bulletin FC 31), 1957 - pp. 513-515


*The page references are to those especially dealing with Kindergarten.

# NOTES